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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER	
JOHNSTON, PHILLIP A	

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 07/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)
	09/986 137	ALMOGY ET AL
	Examiner	Art Unit
	Phillip A Johnston	2881

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION

after SIX (6) MONTHS from the mailing date of this communication

Status

1) ☐ Responsive to communication(s) filed on ______

2a) ☐ This action is **FINAL** 2b) ☒ This action is non-final

3) ☐ Since this application is in condition for allowance except for formal matters prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle* 1935 C D 11 453 O G 213

Disposition of Claims

4) ☒ Claim(s) 1-44 is/are pending in the application

4a) Of the above claim(s) ______ is/are withdrawn from consideration

5) ☐ Claim(s) ______ is/are allowed

6) ☒ Claim(s) 1-44 is/are rejected

7) ☐ Claim(s) ______ is/are objected to

8) ☐ Claim(s) ______ are subject to restriction and/or election requirement

Application Papers

9) ☐ The specification is objected to by the Examiner

10) ☒ The drawing(s) filed on 07 November 2001 is/are a) ☒ accepted or b) ☐ objected to by the Examiner

Applicant may not request that any objection to the drawing(s) be held in abeyance See 37 CFR 1.85(a)

11) ☐ The proposed drawing correction filed on ______ is a) ☐ approved b) ☐ disapproved by the Examiner

If approved, corrected drawings are required in reply to this Office action

12) ☐ The oath or declaration is objected to by the Examiner

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f)

a) ☐ All b) ☐ Some * c) ☐ None of

1. ☐ Certified copies of the priority documents have been received

2. ☐ Certified copies of the priority documents have been received in Application No ______

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a))

* See the attached detailed Office action for a list of the certified copies not received

Detailed Action

Claims Rejection – 35 U.S.C. 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Pub. No. 2002/0033449, to Nakasuji, in view of Sogard, U.S. Patent No. 6.014.200

Regarding Claims 1-20,31,32,41 and 42, Nakasuji (449) discloses a primary optical system 72, which is an optical system that irradiates an electron beam against a top surface of a wafer W being inspected, and comprises an electron gun 721 for emitting an electron beam, an electrostatic lens or a condenser lens 722 for converging the primary electron beam emitted from the electron gun 721, a multi-aperture plate 723 disposed beneath the condenser lens

demagnifying the primary electron beams, a Wien filter or an E X B separator 725, and an objective lens 726, which are sequentially arranged with the electron gun 721 in the topmost level as shown in FIG. 7 so that an optical axis of the primary electron beam emitted from the electron gun should be normal with respect to the surface of an object S to be inspected. See Paragraph [0347]

Nakasuji (449) discloses in FIG. 37, reference numeral 4101 is a single electron gun having an integrated cathode for emitting an electron beam used in inspection, 4103 is a condenser lens, 4105 is a multi-aperture plate for forming a plurality of electron beams from the electron beam exited from the condenser lens, 4107 is a NA aperture plate arranged at a location of an enlarged image of an electron beam source formed by the condenser lens, 4111 is a lens for contracting the plurality of electron beams formed by the multi-aperture plate at a certain reduction ratio to be imaged thereafter on a surface of an object to be inspected or a sample 4113, and 4115 is an E X B separator for separating secondary electrons passed through the lens from the primary electrons. Herein, the integrated cathode implies the cathode materials such as single-crystal LaB sub.6 or the likes whose tip portions having been processed in various shapes, as recited in Claim 6. See Page 41,paragraph [0540] and [0541]

Nakasuji (449) also discloses that the main controller has a function to obtain an image signal from an optical microscope, and also has a stage vibration compensating

compensating function for detecting a displacement of the sample observation point in the Z direction (in the axial direction of the secondary optical system) and feeding back the detected displacement to the electronic optical system so as to automatically compensate the focal point. Sending and receiving operations of the feedback signal to/from the electronic optical system and sending and receiving operations of the signal to/from the stage are performed via the controlling controller and the stage controller respectively. The stage controller is mainly responsible for control regarding the movement of the stage so that precise movement in the X and the Y directions may be on the order of mμm (with tolerance of about +/-0.5 mμm). Further, in the present stage, control at the rotational direction (θ control) is also performed with a tolerance equal to or less than about +/-0.3 seconds. See Page 18 Paragraph [0207] and [0209].

Nakasuji (449) further discloses in FIG. 31, the detector 3007 may comprise a multi-channel plate 3050, a fluorescent screen 3052, a relay optical system 3054 and an image sensor 3056 composed of a plurality of CCD elements, as recited in Claims 14-16. The multi-channel plate 3050 comprises a plurality of channels within the plate so as to generate more electrons during the secondary electrons formed into the image by the electrostatic lens 3006 passing through those channels. That is, the multi-channel plate 3050 amplifies the secondary electrons. See Page 34, paragraph [0450].

in Claim 10; however. Sogard (200) discloses that the beam shaping section 108 includes a first multi-aperture array 116 and optionally, a shield 118 that protects the first multi-aperture array 116 from being struck by electrons. The first multi-aperture array 116 has m rows and n columns of apertures and each aperture has a first shape. The shield 118 also has m rows and n columns of apertures and each aperture has approximately the same shape as the apertures in the first multi-aperture array 116. However, the dimensions of the apertures in the shield 118 are larger than the dimensions of the apertures in the first multi-aperture array 116 because the apertures in the multi-aperture array 116 define the shape of the electron beamlets. See Column 6, line 65-67 and Column 7, line 1-9

An electron lens group, represented by electron lens elements 122 and 124, directs each of the electron beamlets towards the center of a corresponding aperture in the second multi-aperture array 126 The two multi-aperture arrays also lie in planes that are optically conjugate to one another The second multi-aperture array 126 also has m rows and n columns of apertures that correspond to the m rows and n columns of the first multi-aperture array 116. However, the apertures in the second multi-aperture array 126 have a different shape (as recited in Claims 18-20). See Column 7, line 32-44. Some possible examples of advanced cathodes that produce beamlets at each multi-aperture location are p-n junction arrays, a photocathode (as recited in Claim 10)illuminated with a periodic array of light beams and field emission

Therefore it would have been obvious to one of ordinary skill in the art that Nakasuji's (449) inspection system can be modified to use beam shaping in accordance with Sogard (200), to provide an electron source that has an emittance value, or magnitude that is much larger than conventional electron sources, thereby improving inspection throughput.

Regarding Claims 21-24, 33-37, and 43, Nakasuji (449) discloses that irradiation spots of the charged particles are arranged by N rows along a moving direction of the sample and by M columns along a direction perpendicular thereto. Every row of the irradiation spots of the charged particles is shifted successively by a predetermined amount in a direction perpendicular to the moving direction of the sample. See Abstract.

Then, images for a plurality of regions to be inspected are respectively obtained, which are displaces one from another while being superimposed partially one on another on the XY plane of the surface of the wafer 3005 (Step 3304). Each of said plurality of regions to be inspected, from which the image is to be obtained, is a rectangular region as designated by reference numeral 3032a, 3032b, ..., 3032k, ..., each of which is observed to be displaced relative to one another while being partially superimposed one on another around the inspection pattern 3030 of the wafer. For example, 16 pieces of images for the regions to be inspected 3032 (the images to be inspected) may be obtained as shown in FIG. 27. Herein, for the image as shown in FIG. 27, ...

ones correspond to the imaged area of the pattern on the wafer 3005. See Page 34, paragraph [0457].

Also, in the scanning electron beam apparatus 3100 of FIG. 33, the sample 3068 is inspected according to the flow chart as illustrated in FIGS. 28 and 29. In this case, the image position (Xi, Yi) at Step 3332 of FIG. 29 corresponds to the central location of the two-dimensional image made by combining a plurality of line images obtained through scanning with the multi-beam. This image position (Xi, Yi) could be sequentially modified in the subsequent processes, which may be performed by, for example, changing the offset voltage of the deflecting system 3080. The deflecting system 3080 performs the normal line scanning by changing the voltage around the set offset voltage. It is apparent that a separate deflecting means other than the deflecting system 3080 may be employed to control the image position (Xi, Yi). See Page 37, paragraph [0491].

Regarding Claims 25-30, 38-40, and 44, Nakasuji (449) discloses that the plurality of focused primary electron beams is irradiated onto the sample S at a plurality of points thereon, and secondary electrons are emanated from said plurality of points. Those secondary electrons are attracted by an electric field of the objective lens 726 to be converged narrower, and then deflected by the E X B separator 725 so as to be introduced into the secondary optical system 74. Each of the images of the secondary electrons focused at the point P3 is focused by the two-stage magnifying lenses 741 [illegible]

detectors 761 disposed correspondingly to each of the apertures 743a detects the image. Each of the detectors 761 thus detects the electron beam and converts it into an electric signal representative of its intensity. The generated electric signals are output from respective detectors 761, and after being converted respectively into digital signals by the A/D converter 762, they are input to the image processing section 763. See Page 26, Paragraph [0352] and [0353].

Nakasuji (449) also discloses the image processing section 763 converts the input digital signals into image data. Since the image processing section 763 is further supplied with a scanning signal for deflecting the primary electron beam, the image processing section 763 can display an image representing the surface of the wafer. Comparing this image with a reference pattern that has been pre-set in a setting device (not shown) allows to determine whether or not the pattern on the wafer W being inspected (evaluated) is acceptable. See Page 27, Paragraph [0354]

Conclusion

3. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (703) 305-7022. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to reach the examiner by telephone are un

response activity, and (703) 872-9319 for after-final responses. In addition the customer service fax number is (703) 872- 9317.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

PJ

May 28, 2003